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(54) Title: IMPROVED PACKAGING <div style="text-align: center;"> </div>		
(57) Abstract <p>A method and apparatus for producing goods (213) packaged within a casing (201) are disclosed. The casing (201) has a first outer casing part (205) and a second outer casing part (207) and at least one of the casing parts (205, 207) has a cup-shaped depression therein with a web of skin packaging material (203) over the depression. Goods (213) are placed between web (203) and the other casing part and the two casing parts (205, 207) are brought together so that the goods (213) stretch the web (203). The two casing parts (205, 207) are then sealed together so that the web (203) is maintained stretchingly engaged with the goods (213). Preferably the web (203) is gas permeable and the casing parts (205, 207) are gas impermeable. A gas for enhancing the keeping properties of the goods (213) is provided between the web (203) and at least one of the casing parts so the gas can permeate the web (203) and assists enhancing the keeping properties of the goods (213). Typically, the gas can be a combination of O₂ and CO₂ when the goods (213) are red meat.</p>		

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IMPROVED PACKAGING

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Field of the Invention

This invention relates to improved packaging and relates particularly, but not exclusively, to packaging for fresh red meats wherein the packaging can be placed on shelves for a considerable period of time
10 without apparent degradation as to colour and/or growth of bacteria.

Description of Prior Art

Hitherto, there have been several proposals by ourselves for the production of packaging of this type. Examples are seen in co-pending Patent Applications
5 PCT/AU84/00131, PCT/AU85/00131, PCT/AU86/00339, PCT/AU87/00243 and PCT/AU87/00297, the disclosures in which are all imported herein.

The present invention relates to an improvement or modification in the invention shown in at least one or
10 more of PCT/AU86/00339, PCT/AU87/00243 and PCT/AU87/00297. It has been found necessary to provide for desired packaging of red meats to have a flexible web of gas permeable plastics material stretchingly engage across the meat. This arrangement places tension forces
15 in the flexible web and makes the product more consumer acceptable.

The specification of PCT/AU86/00339 describes a packaging of the type shown by Figures 1 and 2 herein.

The specification of PCT Patent Application
20 PCT/AU87/00297 describes a packaging of the type shown by Figure 3 herein.

In Figures 1 and 2 there is shown packaging of clear plastics material comprising a relatively rigid base 1 with an upper lid 9. Goods 3 are packaged within
25 the base 1 and a skin wrapping material 7 skin wraps the goods 3 relative to the base 1. The skin wrapping material 7 and the lid 9 are bonded around a peripheral lip 5 as by heat bonding which seals the packaging. The lid 9 is relatively rigid and of similar thickness to
30 that of the base 1. Both the base 1 and the lid 9 are substantially gas impervious in certain embodiments and the skin wrapping material 7 is a relatively thin web which is gas permeable. A free space 11 is provided above the skin wrapping material 7 and the lid 9 and a
35 gas is provided within the free space 11 for enhancing preservation of the packaged goods 3. The gas can be provided to enhance the colour keeping properties as well

as the non-bacteria growth properties. The flexible web 7 is gas permeable such that the gas within the free space 11 can permeate the web 7 to contact the goods 3 to enhance the keeping properties of the goods 3. It has been found that after an extended period of time, as for example several weeks, as the gas in free space 11 permeates the web 7 there is at least partial pressure equalization so that the web 7 is no longer tightly skin wrapping the goods 3. The appearance of the package can then be unpleasant and thus the package can be rejected by an intending purchaser.

In the embodiment shown in Figure 3 the construction is very similar to that shown in Figures 1 and 2, but here the skin web 7 is stretched downwardly onto lower lips 13. The height of the goods 3 is above the height of the lower lips 13 and hence by bonding of the skin web 7 at region 17 to the lower lips 13, it is possible to maintain the tension displacement of the web 17 and to thus hold the goods 3 firmly to the base 1. In the embodiments shown in the above described specification of PCT Application PCT/AU87/00297 it can be seen that the goods, particularly red meats, are in firm contact with the base of the outer container. It has been found necessary in some instances to configure the base from an opaque rigid material so that the undersurface of the meat cannot be viewed. This is because when the meat is in close contact with the base gases are unable to freely circulate to the surface of the meat which contacts the base and therefore that surface discolours dark brown. This is completely unattractive to an intending purchaser. By providing the base with an opaque material, any discolouration of the meat is not observed by an intending purchaser. However, because the base is opaque, many intending purchasers reject the package simply because they cannot view the entire surface of the meat.

We have discovered that by employing a different method for the production of the packages than hitherto proposed, adequate holding of the goods by the gas permeable flexible web(s) can be achieved. Certain
5 embodiments enable the goods to be suspended between the base and the lid of the packaging and thus it is possible to enable the preserving gas to contact all surfaces of the goods by permeating through the gas permeable webs which are employed. This, in turn, enables both the lid
10 and base, in certain embodiments to be made of clear transparent plastics material so that all surfaces of the goods can be observed by an intending purchaser.

Objects and Statements of the Invention

Therefore, in accordance with a first broad
15 aspect of the present invention there may be provided a method of packaging goods within an outer packaging casing, said method comprising providing a first outer packaging casing part and a second outer packaging casing part, at least one of the casing parts having a
20 cup-shaped depression therein, and a web of skin packaging material over the depression, placing goods to be packaged between said web of skin packaging material and the other casing part, bringing the two casing parts together so that the goods stretch said web of skin
25 packaging material, and sealing the two casing parts together so said web of skin packaging material is maintained stretchingly engaged with said goods.

In accordance with a further aspect of the present invention there may be provided apparatus for
30 producing packaged goods within an outer packaging casing, said apparatus comprising means for placing a first outer casing packaging part over a second outer casing packaging part at least one of the casing parts having a depression therein with a web of skin packaging
35 material over the depression, means for relatively moving the casing parts together with goods between the casing

parts so that when the casing parts are together the web of skin packaging material will be stretched by contacting with said goods, and means for sealing the two casing parts together so said web of skin packaging material will be stretchingly engaged with said goods.

Brief Description of the Drawings

In order that the present invention can be more clearly ascertained, reference will now be made to examples of particular embodiments of the invention as shown in the accompanying drawings wherein:

Figures 1 to 3 are prior art as referred to previously;

Figure 4 is a side sectional view of one form of preferred packaging according to the present invention prior to loading of goods therein;

Figure 5 is a view similar to Figure 4 showing goods loaded therein;

Figure 6 is a view similar to Figure 4 and 5 showing closing of the packaging;

Figure 7 is a top perspective view of the closed package;

Figure 8 is a side cross-sectional view showing a variation of a manufacturing method for providing the packaging;

Figure 9 is a schematic view showing in diagrammatic form a typical packaging machine for producing the packaging shown in Figures 4 through 7; and

Figure 10 is a schematic view showing in diagrammatic form a typical packaging machine for performing the method shown in Figure 8.

Referring now to Figures 4 through 7 it can be seen that a preferred package is comprised of an outer casing 201 and an inner envelope webs 203. The outer casing is composed of two parts - a first part 205 and a second part 207 which is substantially identical in size

and shape to that of first part 205. The first part 205 is preferably hinged to the second part 207 as shown by the hinge centre line 209. Preferably the first part 205 and the second part 207 are thermo-formed in line end for end in a single web of plastics material. The outer casing 201 is preferably of a plastics material such as P.V.C./P.E. formed into two distinct trays as shown. Other suitable materials comprise P.V.C., or P.V.C./E.V.A.. The thickness of the outer casing 201 is in the order of 400 microns. When P.V.C./E.V.A. is used the P.V.C. can be 400 micron thick and the E.V.A. 50 micron thick.

Layers of different plastics materials can be utilized to provide a multi-layered web to permit heat sealing together of the plastics packaging components and to provide for substantial exclusion of atmosphere into the package.

The material of the inner envelope 203 is typically of a web of flexible plastics skin wrapping material and is comprised of polyethylene or a multi-layered web of polyethylene/E.V.A. or like material(s). A typical thickness for the inner envelope 203 is approximately 20 to 25 microns thick. The inner envelope 203 can be of a linear low density polyethylene or a linear low density E.V.A. material. The inner envelope 203 is preferably heat sealed but it may otherwise be sealed around the peripheral edges of each of the portions 205 and 207 which define the outer casing 201.

A suitable gas to enhance the keeping qualities of the packaged goods, particularly the colour keeping qualities, is retained between the inner envelope 203 and the outer casing 201. A suitable gas for enhancing the keeping qualities of red meat can conveniently be a combination of O_2 and CO_2 and/or nitrogen or any one of those gases. Other gases known for enhancing the keeping properties of the packaged goods can be used if desired.

Typically, the gas is in the percentage of 20% CO₂ and 80% O₂. The O₂ assists in retaining the red colour of red meats whilst the CO₂ inhibits the growth of bacteria. The gas is at a pressure slightly less than atmospheric pressure and hence the inner envelope web 203 is urged by atmospheric pressure into each respective casing 205 and 207. The plastics material chosen for webs of the inner envelope 203 is preferably such that certain gas can permeate therethrough. It is particularly preferred that the webs of inner envelope 203 allow O₂ to readily permeate therethrough.

Goods 213, such as red meats or other fresh foods or other goods, are then placed on one of the halves of the package. It can be seen that the goods 213 are placed onto the web of the inner envelope 203 causing it to stretch downwardly slightly. This is shown in the second part 207 in Figure 5. The first part 205 is then swung about hinge centre line 209 like the swinging of a clam shell, so that the first part 205 lies directly above the second part 207. When the first part 205 is closed over the second part 207 so that the peripheral flanges of each of the trays mate in abutting relationship, the goods 213 cause deformation of the web of the inner envelope 203 in the first part 205 and possibly further deformation of the web of the inner envelope 203 in the second part 207. Thus, the webs of the inner envelope 203 are stretched both in the first part 205 and in the second part 207. The webs are also stretched across the flanges of each of the trays of the outer casing 201.

A suitable gas such as of the type previously described may be provided in the space between the webs of the inner envelope 203 in the first part 205 and second part 207. This gas can be at a pressure less than atmospheric and less than the pressure of the gas between the respective webs of inner envelopes 203 and the first part 205 and the second part 207. The flanges of the

trays of the outer casing 201 will align and can then be heat sealed together to form a sealed closed packaging as shown in Figure 7.

The above packaging suspends the goods between the outer casing 201. The webs of the inner casing 203 are of a material which allows certain gases such as O_2 to pass and thus the O_2 in the gas which is in the spaces 211 can pass through the webs of the inner casing 203 and contact the outer surface of the goods 213. Certain gases which may exude or be generated by the packaged goods can pass through the webs of the inner casing 203.

Because the webs of the inner casing 203 are stretched over the goods 3, the webs will remain stretched should there be a tendency for gas pressure equalization between the space inside the inner casing 203 of the package, and between the inner casing 203 and the first part 205 and second part 207 after a period of time.

Figure 8 shows a variation where instead of having a hinge connection between a first part 205 and a second part 207 so that the portions hinge together in a clam shell arrangement, there is provided two distinct webs of outer casing material 201, each with a plurality of tray depressions formed therein. Respective inner casing webs 203 can be provided across the depressions in each of outer casing webs 201. Suitable gases for enhancing the keeping properties of the packaged goods can be provided in the space 211 between the webs of outer casings 201 and webs of inner casings 203, in each web. The webs of inner casing 203 can be heat sealed to the outer casing 201 in each web thereby retaining that gas in the space 211. The two webs of outer casings 203 can be brought together so that each depression is in alignment, and prior to the two being brought together, goods 213 can be placed on the lower of the webs. Thus, when the webs are brought together the inner casings 203 in each will stretch over the goods 213 and suspend the

goods 213 spaced from the outer casing 201. The two webs of outer casing 203 can then be sealed by a heat sealing member to provide individual sealed packages.

Figure 9 shows a schematic diagram of a preferred machine for producing packages in accordance with Figures 4 through 7.

A web of outer casing material 201 is fed from a stock roll supply 215. The web 201 passes to a thermo-forming station 216 where two tray shaped depressions are formed simultaneously end for end repetitively in the web 201. The two tray shaped depressions can be considered as a pair 217 one of which will constitute the first part 205 and the other of which will constitute the second part 207. The pair of trays 217 then pass to an inner casing and gas sealing station 219. The station 219 is substantially identical to the station for gas flushing and sealing shown in aforementioned PCT Patent Specification PCT/AU84/00131. A web of inner casing material 203 is supplied from a stock supply 221 and passes diagonally through an aperture 223 in a gas flushing plate 225. An upper chamber 227 and a lower chamber 229 are then closed onto the gas flushing plate 225 and gas emitted from the plate 225 underneath the web of inner casing 203 which extends diagonally between the gas flushing plate 225. A heated platen 231 can then be lowered to heat seal the inner casing material 203 around the peripheral edges of each of the depressions in the pair of depressions 217. Full details of the arrangement at station 219 can be ascertained from reading the aforementioned PCT Specification PCT/AU84/00131.

As the pair of depressions 217 leave the inner casing and gas sealing station 219, they pass to a goods loading station 233 where goods 213 can be placed into the second part 207 of the pair of depressions 217.

The pair of depressions 217 then pass to a severing station 235 where only the first part 205 is severed from the web by a punch 236 around three sides of its depression. It is left interconnected with the flange along the edge which adjoins the depression of the second part 207. Thus, the second part 207 is retained relative to the web 201 whilst the first part 205 is severed such that it can swing relative to the web 201.

The severing station 235 may precede the goods loading station 233 if desired.

The pair of depressions 217 then advance to a casing closing station 237 where the first part 205 is caused to swing by a casing moving part 218 upwardly relative to the web 201 to close the packaging.

The closed packaging 239 is then advanced to a gas flushing and heat sealing station 241. Here the gas flushing and heat sealing station 241 comprises an upper chamber part 243 and a lower chamber part 245 which are closed and in which a gas is injected so as to supply such gas between the webs of inner casings 203 and to contact the goods 213. Electrical impulse heat sealing surfaces (not shown) on the edges of the upper chamber part 243 which abut with the lower chamber part 245 can then be activated to heat seal the first part 205 to the second part 207.

The packaging 239 is therefore sealed closed with a desired gas in the space 211 and with the inner casing 203 stretched over the goods 213. A desired gas is also between the inner casings 203 and contacting the goods 213. The closed packaging 239 is still retained in the web 201. Accordingly, it then passes to a punching station 247 where it is punched from the web 201 to cause it to fall by gravity to be discharged to a suitable collection area. The waste material in the web 201 can be rolled into a waste roll 249 for subsequent re-use.

Referring now to Figure 10 there is shown an embodiment of apparatus for producing packaging according to the method shown in Figure 8. Like components to those shown in the machine in Figure 9 have been provided with the same designations. The schematic diagram is basically self explanatory. It can be seen that there are provided upper and lower webs 201 and respective thermo-forming stations 216 and gas sealing stations 219. Each of the upper and lower webs 201 provides respectively the first container part 205 and the second container part 207. After goods have been loaded at the goods loading station 233 into the first container part 205, the depressions pass to the heat sealing station 241 where the first container parts 205 and the second container parts 207 are brought together and heat sealed. It can be seen that the second container parts 207 pass over a roll 271 and then under a further toothed roll 273 so that the respective depressions in each of the webs can be brought into alignment.

The machines and methods described above produce a package 239 which contains goods such as red meat encapsulated and suspended between two membranes of thin, highly gas permeable, flexible materials. This is all contained with an outer casing 201 of transparent plastics material which allows inspection of the red meat from all sides in a condition which is appealing to the intending purchaser.

In order to aid speed of production, the machines shown in Figures 9 and 10 can be arranged to produce a series of pairs of depressions 217 across a wide web 201 so that more than one pair of depressions 217 is processed simultaneously at each of the various stations.

Figures 11 through 15 show variations of packaging which can be produced in accordance with the above methods and by the above apparatus. The packaging has the same designations for the various parts as that

in the previous embodiments. In the embodiment shown in Figure 11 the second container part 207 does not include a web of skin packaging material. The second container part 207 is rigid relative to the web of skin packaging material 203 retained within the first container part 205. Typically, the second container part may be of non-transparent plastics of the same material and same thickness as that described for the previous embodiments. When the first container part 205 and second container part 207 are sealed together at seal 281 the second container part presses directly against the goods 213 and stretches the web of skin packaging material 203. The necessary preserving gas can be retained between the web of inner casing 203 and the first container part 205 if desired. Such gas will assist the keeping qualities of the packaged goods by permeating through the web of the inner casing 203.

Figure 12 shows an embodiment similar to that previously described except that the first container part 205 has an upper peripheral lip 283, and a further lip 285 intermediate the upper lip 283 and the bottom of the depression in the first container part 205. Here it can be seen that the webs of the inner casing 203 are bonded to the peripheral lip. Preferably the peripheral lip 285 is continuous around the first container part 205 and the sealing is continuous around the lip 285. The second container part 207 has its respective web of inner casing 203 sealed thereto with a desired gas for enhancing the keeping qualities of the packaged goods 213 therein. Similarly, a desired gas for enhancing the keeping properties of the packaged goods 213 can be placed between the web of inner casing 203 and the first container part 205 prior to the sealing on the intermediate lip 285. The first container part 205 and second container part 207 can then be bonded at the upper

peripheral lip 283 to hold the package together and to provide the necessary stretching in the webs of inner casing 203.

The embodiment shown in Figure 13 is very similar to that shown in Figure 12 except that it is necessary to provide a web of inner casing 203 over the goods 213 and seal it to the further lip 285 prior to sealing the second container part 207 at the upper peripheral lip 283. A desired gas for enhancing the keeping properties of the packaged goods 213 can be provided in the space between the web of the inner casing 203 - and the second container part 207.

The embodiments of Figures 14 and 15 are substantially identical to each other but here it can be seen that the second container part 207 is like a lid which has a peripherally extending projection means 287. When the lid is fitted to the first container part 205 it will urge the web of the inner container 203 into an even further stretching relationship over the goods 213 than that provided by any of the previously described embodiments. In this connection, the sealing can be at the upper peripheral lip 283. Figure 15 is different to Figure 14 in that a web of inner casing 203 is first bonded to the further lip 285 of the first container part 205 prior to the lid being applied thereto. The lid is sealed at the upper peripheral lip 283 when it is fitted to the first container part 205. If desired the first container part 205 may be of relatively flexible material such that the first container part 205 and the integrally attached web of inner casing 203 form a flexible bag onto which the goods 213 are received. Desirably, the first container part 205 can be made of a strong plastics material sufficient to withstand the pressure of a person's finger pressing thereon to feel the goods 213 packaged within the package. In this connection it has been found that with red meat some purchasers like to press the meat to see if it meets their degree of

firmness. By having the first container part 205 of such a flexible material it will inhibit rupturing of the first container part 205 when this pressing action occurs.

5 In the embodiments shown in Figures 11, 14 and 15, the lid may be of a non-transparent material in order that any darkening of red meats which may occur as a result of the goods 213 contacting or spreading over the undersurface of the lid and prohibiting the gas which is
10 within the packaging to contact all surfaces of the red meat.

 In the embodiments shown in Figures 12, 13 and 15, the desired gas is sealed relative to the first casing part 205 and web of inner casing 203 prior to the
15 goods 213 being loaded into the packaging. Thus, problems which could be encountered by contamination of the sealing surfaces such as at the upper peripheral lip by contamination from the goods 213 as they are loaded is avoided. Accordingly, the gas can be securely retained
20 within the first container part 205.

 In the embodiment shown in Figures 14 and 15, the second container part 207 - the lid - may be sealed around the upper peripheral lip 283 prior to being sealed to the first container part 205. The necessary desired
25 gas may be placed between the web of inner casing 203 and the second container part 207 prior to such sealing.

 In any of the embodiments described herein it is not essential to include a gas to enhance the keeping qualities of the packaged goods. In such circumstances
30 the gas which is in the package between the web of skin packaging, i.e. the web of inner casing 203 and the first container part 205, the web of inner casing 203 and the second container part 207, may be atmosphere. Such packaging may have use in certain applications and for
35 certain goods.

Further, it is not essential to provide a gas to enhance the keeping qualities of the packaged goods within the inner casing 203 but we consider it preferable.

5 Modifications may be made to the invention as would be apparent to persons skilled in the packaging arts.

 These and other modifications may be made without departing from the ambit of the invention, the
10 nature of which is to be determined from the foregoing description and by the appended claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A method of packaging goods within an outer packaging casing, said method comprising providing a first outer packaging casing part and a second outer packaging casing part, at least one of the casing parts having a cup-shaped depression therein, and a web of skin packaging material over the depression, placing goods to be packaged between said web of skin packaging material and the other casing part, bringing the two casing parts together so that the goods stretch said web of skin packaging material, and sealing the two casing parts together so said web of skin packaging material is maintained stretchingly engaged with said goods.

2. A method as claimed in Claim 1, further comprising providing a gas for enhancing the keeping properties of said goods between said at least one casing part and said web of skin packaging material and wherein said web of skin packaging material is gas permeable whereby said gas will be retained within said packaging when the two casing parts are sealed together and can permeate said web of skin packaging material.

3. A method as claimed in Claim 2, comprising sealing said gas between said at least one casing part and said skin packaging web prior to bringing the two casing parts together.

4. A method as claimed in Claim 1, wherein both casing parts have cup-shaped depressions therein and providing each with a respective web of skin packaging material over the respective depression, and whereby when the two casing parts are brought together, stretching both webs of skin packaging material, and then sealing the two casing parts together so both webs of skin packaging material are maintained stretchingly engaged with said goods.

5. A method as claimed in Claim 4, further comprising providing gas for enhancing the keeping properties of said goods between each casing part and its

respective web of skin packaging material, and wherein said webs of skin packaging material are gas permeable, whereby the gas will be retained within said packaging when the two casing parts are sealed together and can permeate said webs of skin packaging material.

6. A method as claimed in Claim 5, comprising sealing the gas between each casing part and its respective web of skin packaging material prior to bringing the two casing parts together.

7. A method as claimed in Claim 2, comprising providing said at least one casing part of material which is rigid relative to the web of skin packaging material which is placed over the depression therein.

8. A method as claimed in Claim 7, comprising providing both said casing parts of material which is rigid relative to the web of skin packaging material which is placed over the depression in said at least one casing part.

9. A method as claimed in Claim 1, comprising providing said at least one casing part with an upper peripheral lip relative to said depression therein and an intermediate lip between said upper peripheral lip and a bottom of said depression, and bonding said web of skin packaging material to said intermediate lip prior to bringing said casing parts together.

10. A method as claimed in Claim 9, further comprising providing a gas for enhancing the keeping properties of said goods between said at least one casing part and said web of skin packaging material and wherein said web of skin packaging material is gas permeable whereby said gas will be retained within said packaging when the two casing parts are sealed together and can permeate said web of skin packaging material.

11. A method as claimed in Claim 4, comprising providing the other casing part with projection means therein which is rigid relative to said web of skin packaging material and when the two casing parts are

brought together causing said projection means to move said web of skin packaging material placed over the depression in said at least one casing part into said depression to provide tension to that web of skin packaging material.

12. Apparatus for producing packaged goods within an outer packaging casing, said apparatus comprising means for placing a first outer casing packaging part over a second outer casing packaging part at least one of the casing parts having a depression therein with a web of skin packaging material over the depression, means for relatively moving the casing parts together with goods between the casing parts so that when the casing parts are together the web of skin packaging material will be stretched by contacting with said goods, and means for sealing the two casing parts together so said web of skin packaging material will be stretchingly engaged with said goods.

13. Apparatus as claimed in Claim 12, wherein said machine comprises gas providing means for providing a gas to enhance the keeping qualities of the packaged goods between the at least one outer casing part and said web of skin packaging material, said web of skin packaging material being gas permeable so that after said casing parts are sealed together the gas will be able to permeate said web of skin packaging material.

14. Apparatus as claimed in Claim 13, including further sealing means for sealing said gas between said at least one casing part and said web of skin packaging material prior to said casing parts being moved together.

15. Apparatus as claimed in Claim 14, comprising means for providing pairs of outer casing parts in a web of outer casing material and means for cutting at least one of the casing parts in said web so that a casing moving part of said apparatus can move the cut casing part over the other casing part prior to the means for relatively moving the casing parts together.

16. Apparatus as claimed in Claim 15, wherein said web is a substantially elongate web and said parts of outer container parts are produced repetitively in said web.

17. Apparatus as claimed in Claim 14, comprising means for producing first container parts repetitively in one web of outer casing material and means for supplying second container parts repetitively in a second web of outer casing material, and wherein said means for moving the two casing parts together brings both web together at said sealing means.

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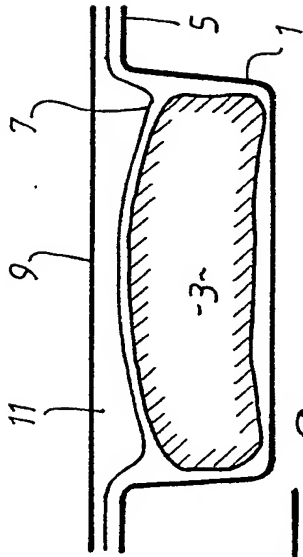


FIG. 2.

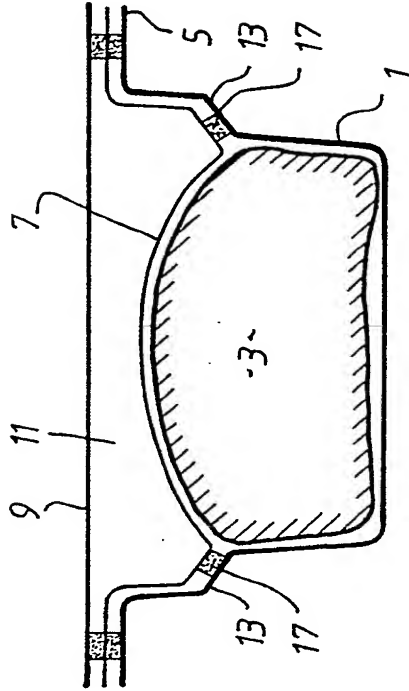


FIG. 3.

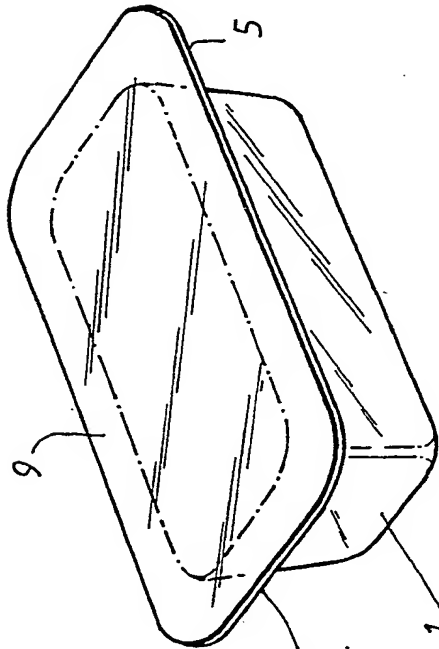


FIG. 1.

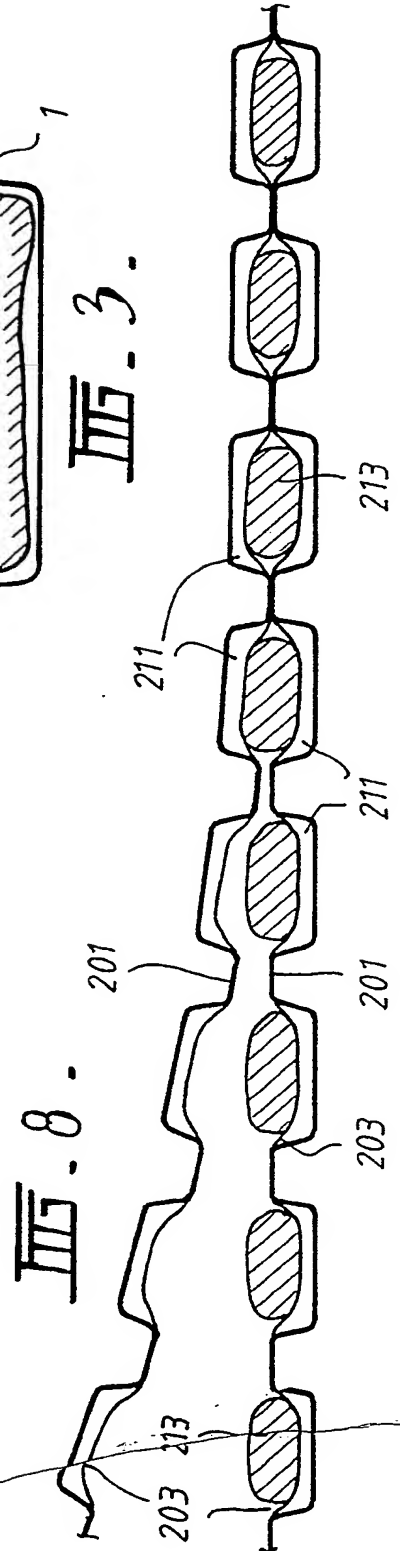
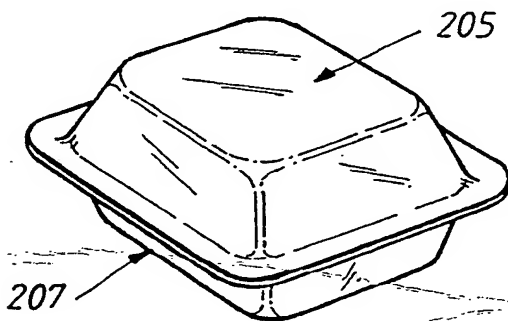
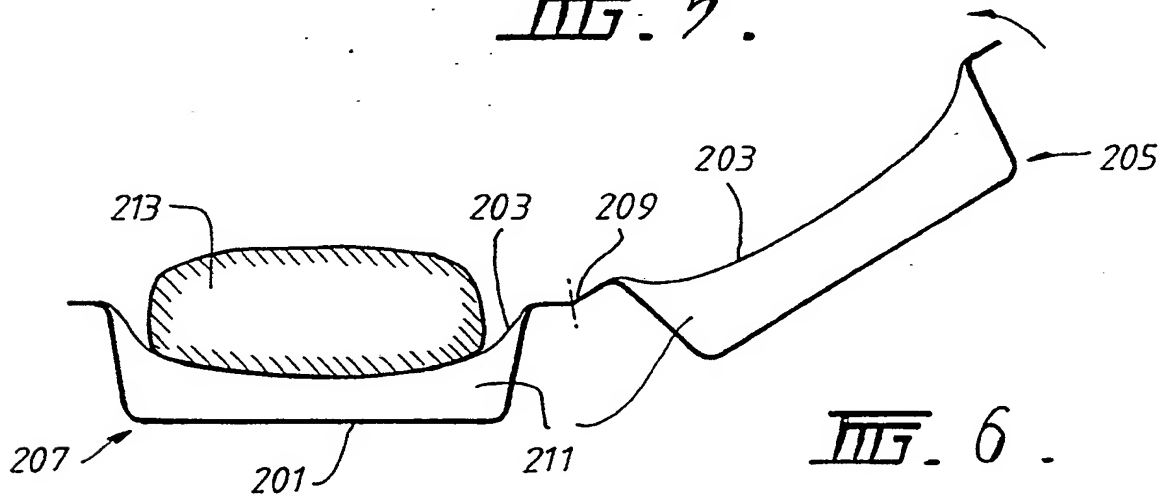
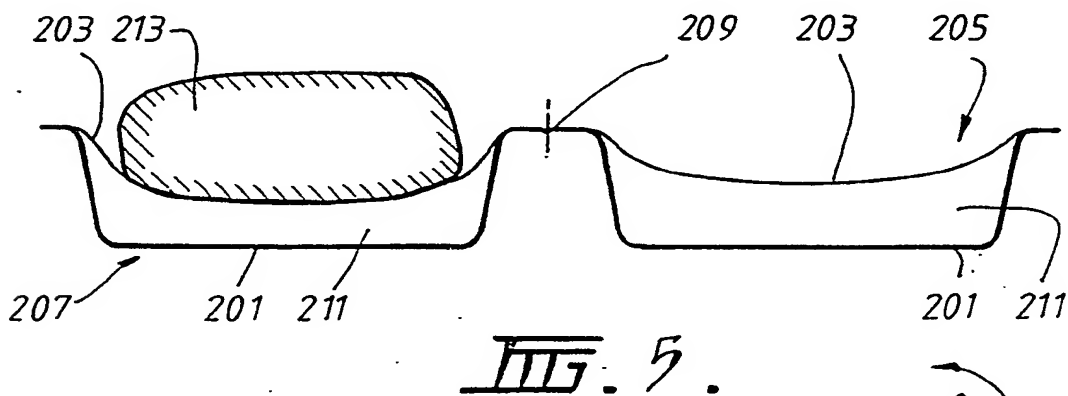
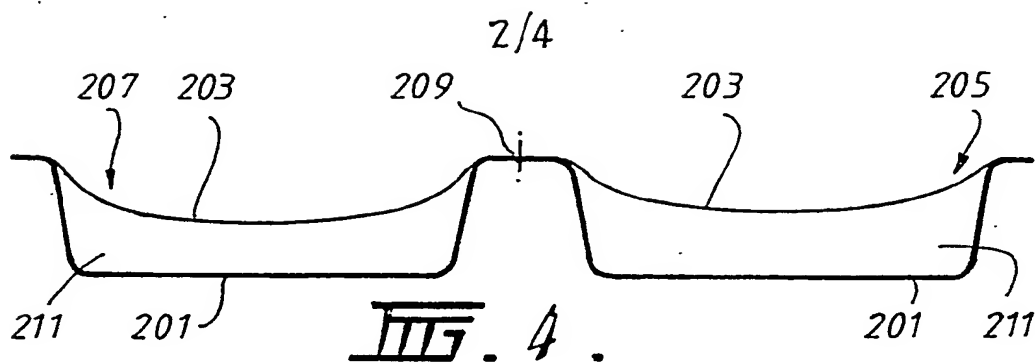
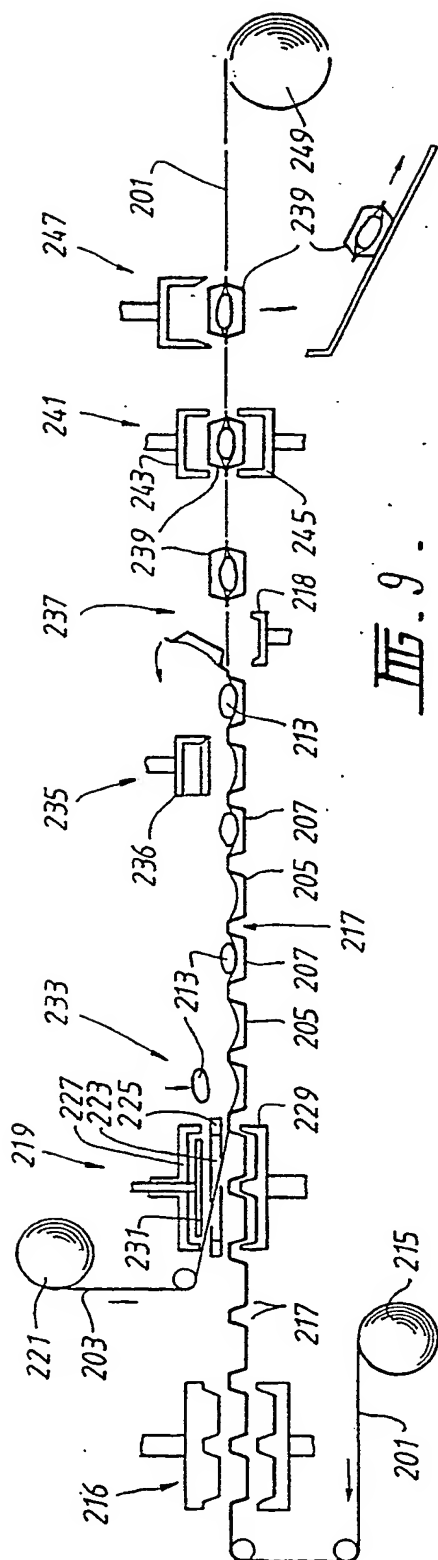
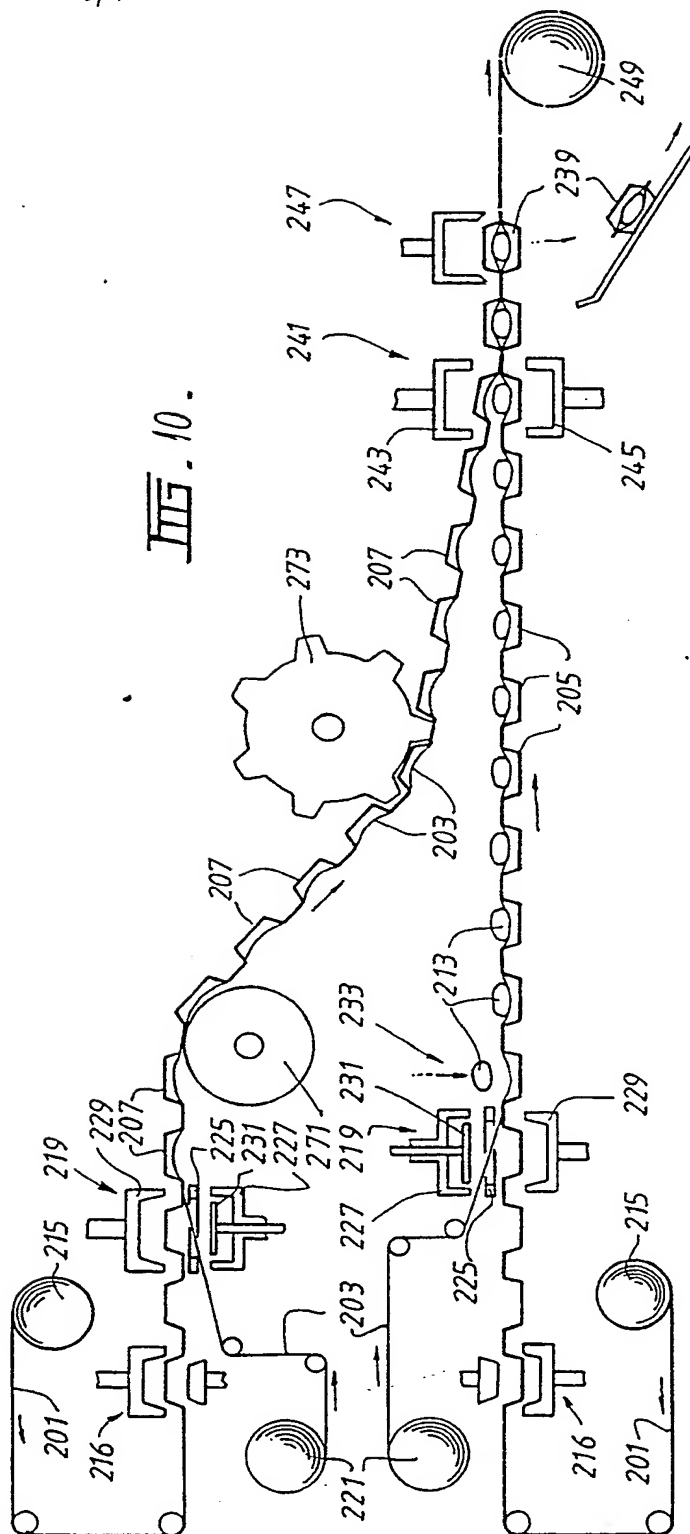


FIG. 8.





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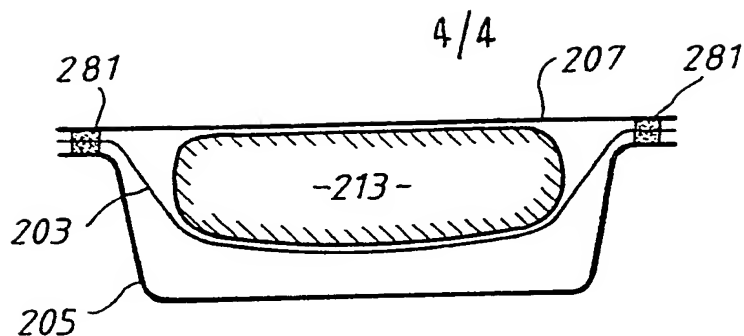


FIG. 11.

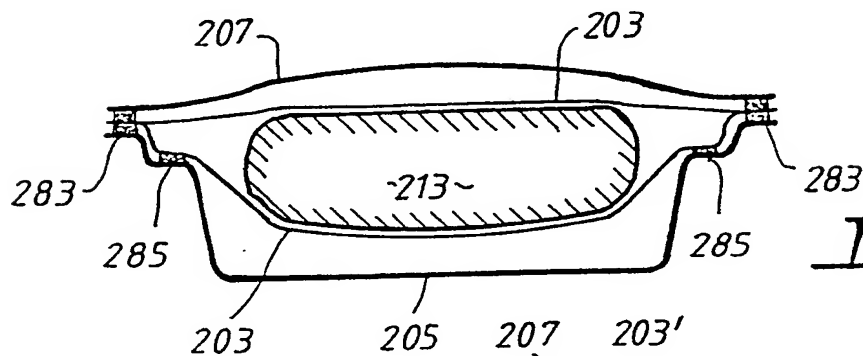


FIG. 12.

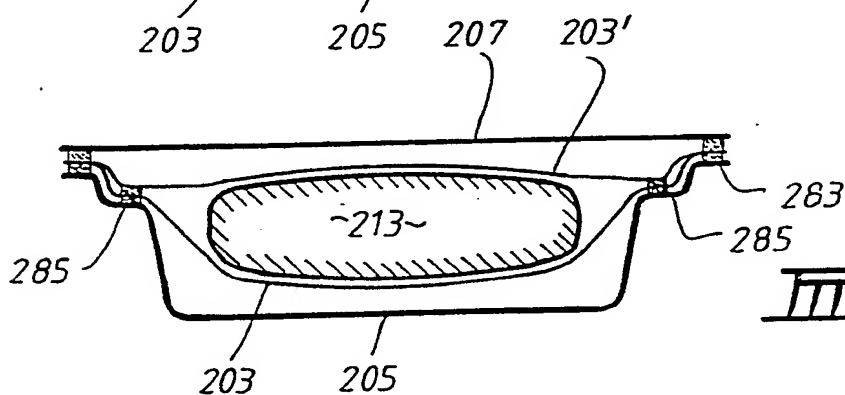


FIG. 13.

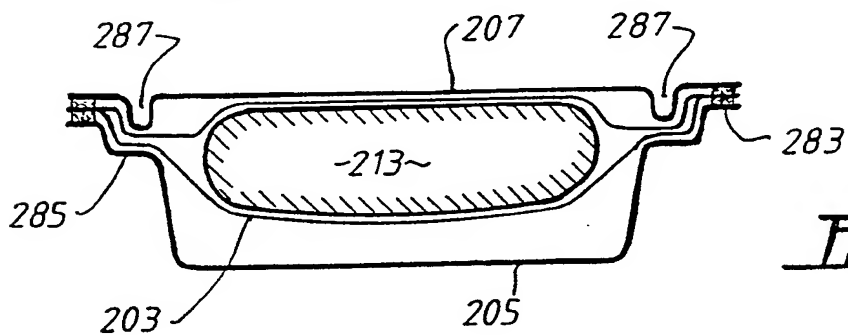


FIG. 14.

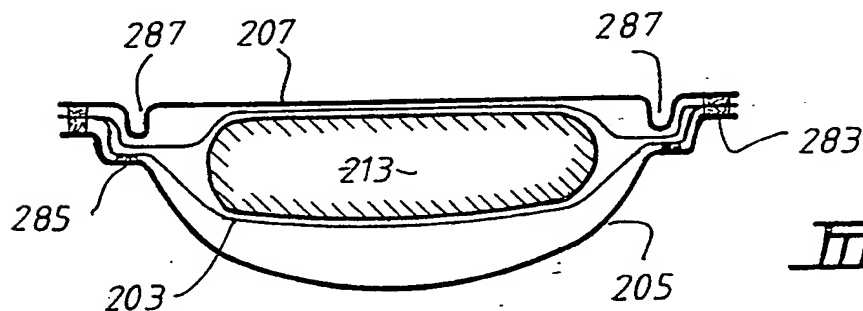


FIG. 15.

INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 88/00424

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁸ According to International Patent Classification (IPC) or to both National Classification and IPC <div style="text-align: center; font-family: monospace;">Int. Cl.⁴ B65B 31/02, 25/02</div>						
II. FIELDS SEARCHED <div style="text-align: right; font-size: small;">Minimum Documentation Searched ⁷</div> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%; border: none;">Classification System</td> <td style="border: none;">Classification Symbols</td> </tr> <tr> <td style="border: 1px solid black; text-align: center; padding: 5px;">IPC</td> <td style="border: 1px solid black; padding: 5px;">B65B 25/02, 31/02</td> </tr> </table> <div style="text-align: center; font-size: x-small; margin-top: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁹</div>			Classification System	Classification Symbols	IPC	B65B 25/02, 31/02
Classification System	Classification Symbols					
IPC	B65B 25/02, 31/02					
AU : IPC as above						
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁶						
Category ⁵	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³				
X	WO,A, 87/02965 (GARWOOD LTD.) 21 May 1987 (21.05.87)	(1-3,5-7,9, 10,12-17)				
Y	US,A, 3681092 (THE DOW CHEMICAL CO.) 1 August 1972 (01.08.72)	(1-17)				
X	US,A, 3467244 (MAHAFFY & HARDER ENGINEERING CO.) 16 September 1969 (16.09.69)	(1-3,5-7,9, 10,12-17)				
X	GB,A, 2041318 (W. VAN OORDT & CO.) 10 September 1980 (10.09.80)	(1-3,5-7,9, 10,12-17)				
Y	GB,A, 1206023 (MAHAFFY & HARDER ENGINEERING CO.) 23 September 1970 (23.09.70)	(1-17)				
X,P	WO,A, 88/00907 (GARWOOD LTD.) 11 February 1988 (11.02.88)	(1-17)				
A	US,A, 3686822 (YOUNG) 29 August 1972 (29.08.72)					
A	US,A, 4058953 (W.R. GRACE & CO.) 22 November 1977 (22.11.77)					
<div style="display: flex; justify-content: space-between; font-size: x-small;"> <div style="width: 45%;"> <p>• Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Δ" document member of the same patent family</p> </div> </div>						
IV. CERTIFICATION						
Date of the Actual Completion of the International Search <div style="text-align: center; font-family: monospace;">6 January 1989 (06.01.89)</div>		Date of Mailing of this International Search Report <div style="text-align: center; font-family: monospace;">19 JANUARY 1989 (19.01.89)</div>				
International Searching Authority <div style="text-align: center;">Australian Patent Office</div>		Signature of Authorized Officer <div style="text-align: center;"> P. WARD </div>				

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 88/00424

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Members			
WO	8800907	AU 77582/87			
WO	8702965	DK 3630/87	EP 292477	AU 66258/86	
US	3686822	CA 959749	DE 2122110	FR 2105779	
US	4058953	CA 1050410			
US	3467244	GB 1206022			
GB	1206023	DE 1611873	FR 1559233		

END OF ANNEX

